

## **IN THE CLAIMS**

1-16. (Cancelled)

17. (Previously Presented) A method for analyzing neuronal activities in neuronal areas of a living subject, comprising the steps of:

obtaining a plurality of signals from spatially distributed neuronal areas of a living subject, said signals respectively representing neuronal activity in different ones of said neuronal areas;

automatically electronically forming a matchable coupling of all of said signals in said plurality of signals using matchable coupling variables that describe a statistical relationship between signals in said plurality of signals that are matchably coupled;

automatically electronically determining respective probabilities for occurrence of said signals based on a higher order statistical distribution of the occurrence of said signals;

automatically electronically determining said matchable coupling variables by optimizing said probabilities; and

automatically electronically analyzing said neuronal activity using said matchable coupling variables to produce an analysis result and making said analysis result available in a humanly perceptible form.

18. (Previously Presented) A method as claimed in claim 17 comprising employing statistical distribution described by an Edgeworth expansion as said higher order statistical distribution.

19. (Previously Presented) A method as claimed in claim 17 comprising employing a sum of normal distributions as said higher order statistical distribution.

20. (Previously Presented) A method as claimed in claim 17 comprising optimizing said probabilities using a maximum likelihood estimation technique.

21. (Previously Presented) A method as claimed in claim 17 comprising employing a relationship between said statistical relationship and said statistical distribution in optimizing said probabilities.

22. (Previously Presented) A method as claimed in claim 17 wherein said signals in said plurality of signals are subject to external influences outside of said living subject, and employing said external influences to determine said statistical relationship.

23. (Previously Presented) A method as claimed in claim 17 comprising determining said plurality of signals by a measurement conducted with respect to said living subject.

24. (Previously Presented) A method as claimed in claim 23 comprising obtaining BOLD signals in said measurement as said plurality of signals.

25. (Previously Presented) A method as claimed in claim 17 comprising obtaining said plurality of signals from an area of the brain of said living subject, as said neuronal area.

26. (Previously Presented) A method as claimed in claim 17 comprising obtaining BOLD signals, as said plurality of signals, in a functional magnetic resonance imaging scan of said living subject.

27. (Previously Presented) A method as claimed in claim 17 comprising analyzing said matchable coupling variable associated with said BOLD signals to diagnose a functional disorder of said area of the brain of the living subject.

28. (Previously Presented) An arrangement for analyzing neuronal activities in neuronal areas of a living subject, comprising:

a signal acquisition device adapted to interact with a living subject to obtain a plurality of signals from spatially distributed neuronal areas of the living subject, said signals respectively representing neuronal activity in different ones of said neuronal areas; and

a computer supplied with said signals, said computer electronically forming a matchable coupling of all of said signals in said plurality of signals using matchable coupling variables that describe a statistical relationship between signals in said plurality of signals that are matchably coupled, and electronically determining respective probabilities for occurrence of said signals based on a higher order statistical distribution of the occurrence of said signals, electronically determining said matchable coupling variables by optimizing said probabilities, and electronically analyzing said neuronal activity using said matchable coupling variables.

29. (Previously Presented) An arrangement as claimed in claim 28 wherein said signal acquisition device is an fMRI scanner and wherein said plurality of signals is a plurality of BOLD signals acquired by said fMRI scanner.

30. (Previously Presented) A computer-readable medium encoded with a data structure for analyzing neuronal activities in neuronal areas of a living subject from a plurality of signals obtained from spatially distributed neuronal areas of a living subject, said signals respectively representing neuronal activity in different ones of said neuronal areas, said data structure, when said medium is loaded into a computer, causing said computer to:

form a matchable coupling of all of said signals in said plurality of signals using matchable coupling variables that describe a statistical relationship between signals in said plurality of signals that are matchably coupled;

determine respective probabilities for occurrence of said signals based on a higher order distribution of the occurrence of said signals;

determine said matchable coupling variables by optimizing said probabilities;

and

analyze said neuronal activity using said matchable coupling variables to produce an analysis result and making said analysis result available in a humanly perceptible form.